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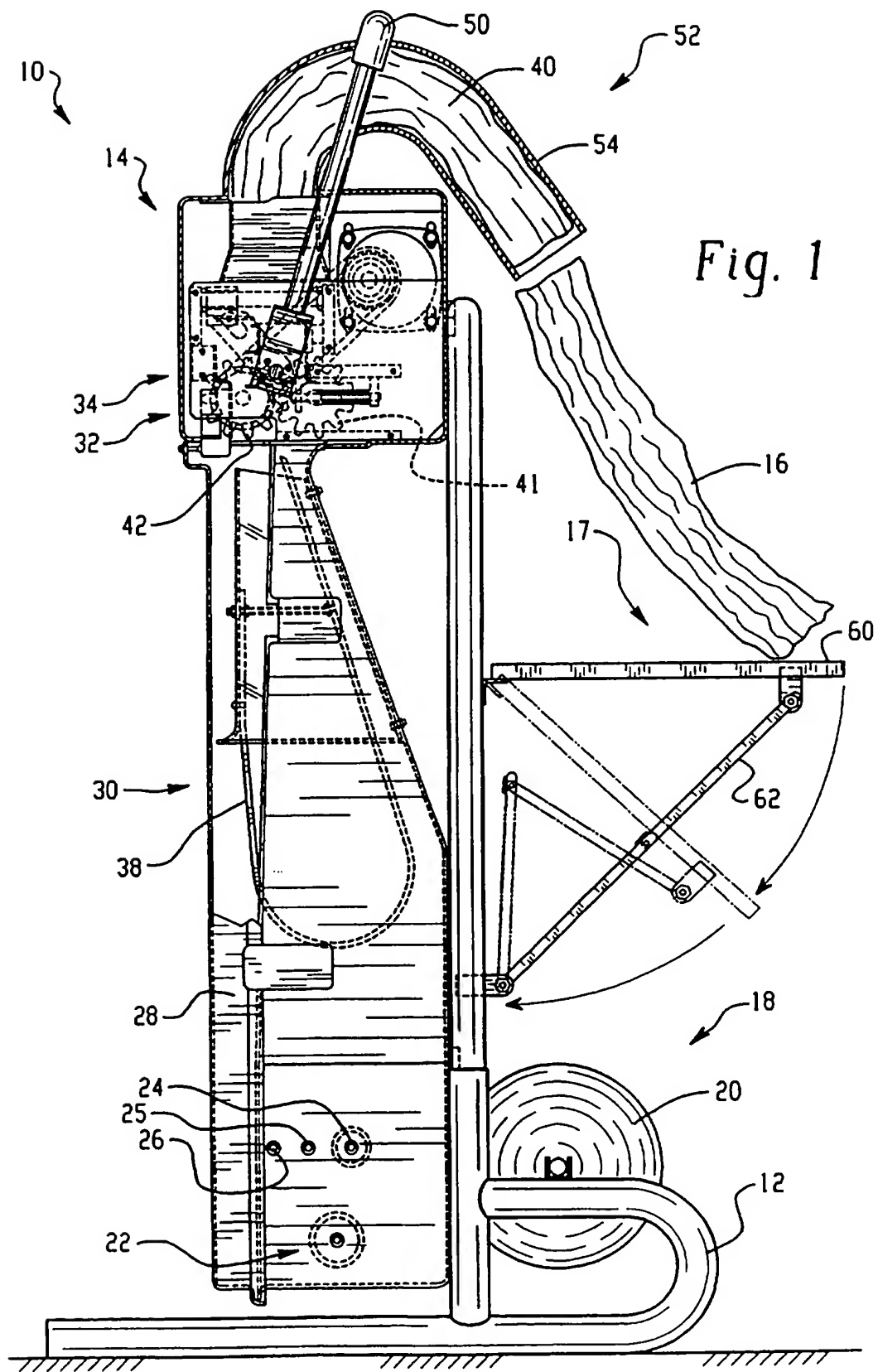
**WO 96/03273 A**

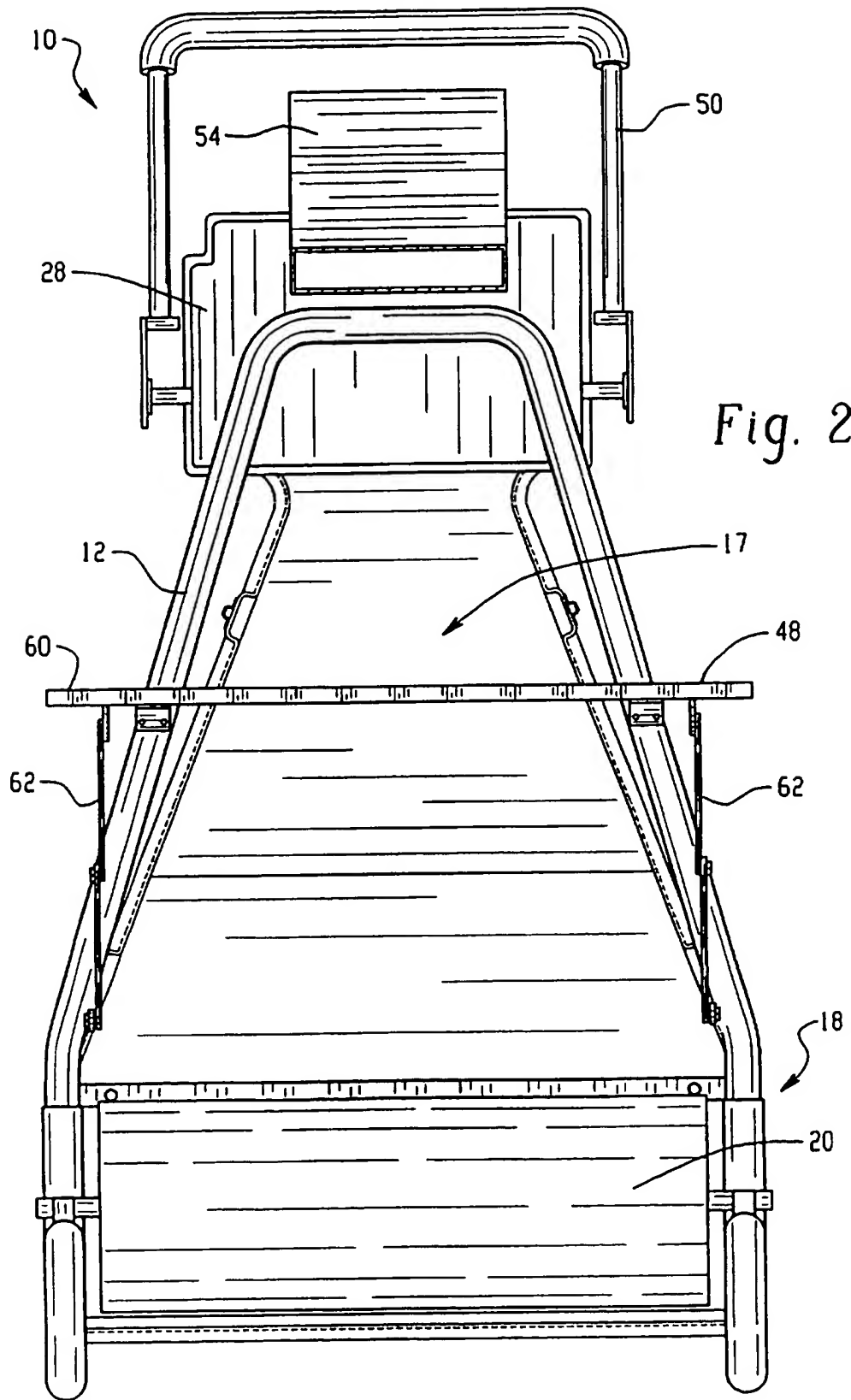
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This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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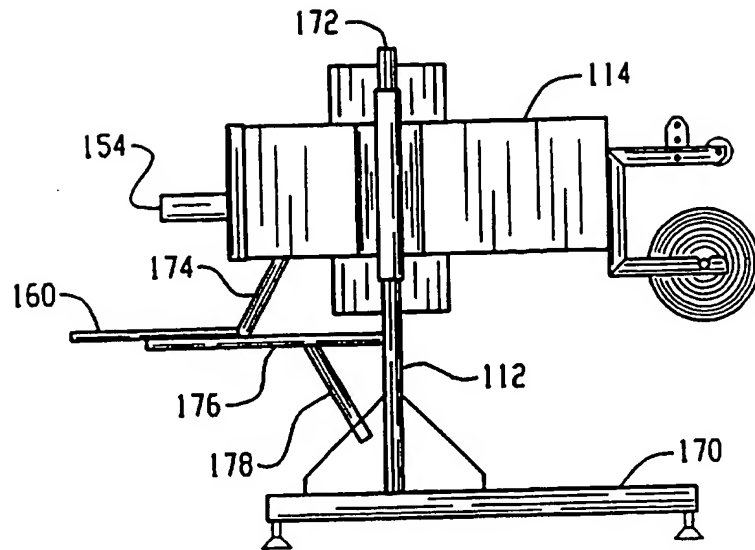


Fig. 3

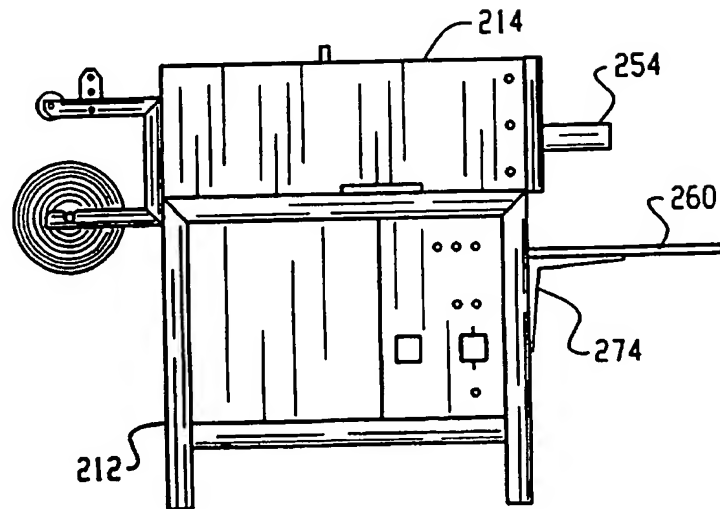


Fig. 4

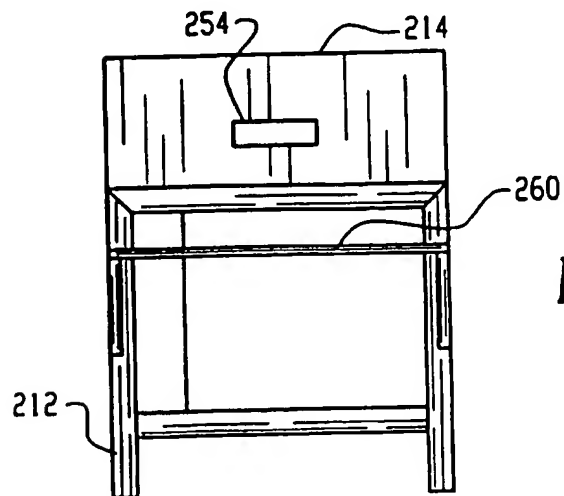


Fig. 5

**INTEGRATED, SELF-CONTAINED PACKAGING SYSTEM AND METHOD****Field of the Invention**

5       The invention described herein relates generally to a packaging system and method for producing a dunnage product from sheet material and for facilitating use of the dunnage product, particularly in a limited space.

**Background of the Invention**

10       In the process of shipping an item from one location to another, a protective packaging material is typically placed in the shipping case, or box, to fill any voids and/or to cushion the item during the shipping process.

15       Some conventional protective packaging materials are plastic foam peanuts and plastic bubble pack. While these conventional plastic materials seem to perform adequately as cushioning products, they are not without disadvantages. Perhaps the most serious drawback of plastic bubble wrap and/or plastic foam peanuts is their effect on our environment. Quite simply, these  
20       plastic packaging materials are not biodegradable and thus they cannot avoid further multiplying our planet's already critical waste disposal problems.

      Consequently, paper protective packaging material has become a very popular alternative. Paper is biodegradable, recyclable and composed of a  
25       renewable resource, making it an environmentally responsible choice for conscientious industries.

      While paper in sheet form could possibly be used as a protective packaging material, it is usually preferable to convert the sheets of paper into a  
30       pad or other relatively low density dunnage product. This conversion may be accomplished by a cushioning conversion machine, such as those disclosed in

commonly assigned U.S. Patent Nos. 4,988,291; 5,123,889 and 5,322,477. The therein disclosed cushioning conversion machines convert sheet stock material, such as paper in multi-ply form, into a relatively low density dunnage product. These machines include a forming assembly through which the sheet stock material is advanced by a feed assembly. The forming assembly causes the sheet stock material to be inwardly folded on itself and crumpled to form a relatively low density strip of cushioning. The strip of cushioning is severed to form pads of desired lengths by a severing assembly downstream of the forming and feeding assemblies.

10

In the above discussed cushioning conversion machines, and in many other types of dunnage pad producing machines, the pads are discharged through an outlet. Typically, the machine discharges the pads to a transitional zone from which the pads may be later removed at the appropriate time for insertion into a container (for example, a box, carton, etc.) for cushioning purposes.

In the past, a variety of arrangements have been used to provide a transitional zone in a packaging system. For example, temporary receptacles (i.e., bins) have been placed adjacent the machine's outlet so that the pads can be discharged therein to form a pile. At the appropriate time, a packaging person would reach into the transitional receptacle, retrieve a pad from the accumulated pile, return to his/her workstation and then insert the pad into the container.

25

Another transitional zone arrangement uses a horizontal packaging surface, such as a table top, onto which the machine deposits the pads. When a packaging need arises, the packaging person picks up the pad from the packaging surface and inserts the pad into the container.

30

Other transitional zone arrangements use conveyors to convey the pads away from the machine. The pads exiting the machine are fed onto a conveyor that transfers them to a packaging station. Often the conveyor also is used to

accumulate a supply of pads that are made available to the packager at the packaging station.

Some of the above mentioned arrangements, however, require permanent installation and occupy a large space. It would be desirable to have a portable packaging system that includes a transitional zone. Furthermore, having a portable packaging system which can be set up quickly and easily in a limited amount of space also would be desirable.

#### Summary of the Invention

The present invention provides an integrated, self-contained packaging system and method for converting multi-ply sheet material into a lower density dunnage product while providing an integral transition zone or packaging shelf, the system providing significant advantages over existing pad production and packaging arrangements.

The invention is characterized by a stand having an integral packaging shelf connected to a side of the stand and a cushioning conversion machine mounted to the stand and including conversion assemblies for converting multi-ply sheet material into a less dense dunnage product. The conversion assemblies are supported within a housing which is in turn supported by the stand. The integral packaging shelf is positioned to receive the dunnage products, e.g., pads, produced by the cushioning conversion machine.

According to a preferred embodiment of the invention, the packaging shelf is retractable to lay substantially parallel to and adjacent a side of the stand, and the cushioning conversion machine is oriented in a substantially vertical position to give the system a relatively small footprint. Preferably the packaging shelf has a width that is equal to or less than the width of the stand.

A preferred embodiment of the method according to the invention includes supplying sheet material to a cushioning conversion machine, moving a

packaging shelf from a vertical retracted position to a horizontal extended position, converting the sheet material into a relatively lower density dunnage product, and depositing the dunnage product on the packaging shelf.

6        The supplying step may include supplying a sheet material that is biodegradable, recyclable and composed of a renewable resource, such as a sheet material including one or more plies of kraft paper, and the depositing step may include depositing the dunnage product into a container supported on the packaging shelf. The method may include one or more additional steps, including  
10 moving the packaging shelf from the horizontal extended position to the vertical retracted position, and/or moving the packaging system to a second packaging location.

      The foregoing and other features of the invention are hereinafter fully  
16 described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail one or more illustrative embodiments of the invention, such being indicative, however, of but one or a few of the various ways in which the principles of the invention may be employed.

20                                **Brief Description of the Drawings**

      Fig. 1 is a side elevational view of the packaging system, with the housing of the cushioning conversion machine partially broken away to show the conversion assemblies therein.

25                                Fig. 2 is a front elevational view of the packaging system of Fig. 1.

      Fig. 3 is a side elevational view of another embodiment of packaging system according to the invention.

30                                Fig. 4 is a side elevational view of still another embodiment of packaging system according to the invention.



Fig. 5 is an end elevational view of the system of Fig. 4.

### **Detailed Description**

9        An exemplary embodiment of the packaging system and method according to the invention will be described with reference to Figs. 1 and 2. The packaging system 10 includes a stand 12, a cushioning conversion machine 14 for producing a dunnage product or pad 16, and a shelf assembly 17 for supporting the dunnage pad 16 until it is needed.

10        The stand 12 is formed of vertical and horizontal framing which is connected in such a manner to provide stable support for the system 10. Although a preferred configuration is shown in Figs. 1 and 2, other configurations may be employed in the construction of the stand. The stand 12 may include  
15        wheels to facilitate moving the system 10 from one location or packaging station to another location or packaging station. The stand 12 preferably includes an integral stock roll holder assembly 18 for supporting a roll 20 of sheet stock material, although other roll support arrangements may be used if desired.

20        The sheet material preferably consists of one or more, typically two or three, superimposed plies rolled onto a hollow cylindrical tube to form the roll 20 of sheet material. The sheet material may be supplied in other forms as well, such as in a fan-folded stack. The sheet material preferably is biodegradable, recyclable and composed of a renewable resource, such as kraft paper.

25        The cushioning conversion machine 14 converts the sheet material into a relatively lower density cushioning/dunnage product or pad 16 (Fig. 1). An exemplary pad 16 produced by the illustrated machine 14 comprises the one or more piles of sheet material which have side or lateral edge portions thereof  
30        folded inwardly over center portions thereof to form laterally spaced apart pillow portions extending along the length of the pad 16. The pillow portions are separated by a central band portion where the lateral edge portions are brought together. The lateral edge portions, which may be overlapped and/or interleaved,

are connected together and/or to underlying center portions of the plies along the central band. In a preferred form of cushioning pad 16, the connecting is accomplished by a combination of colining and stitching, the stitching being effected by perforations and/or cut tabs disposed along the central band.

- 5 However, it will be appreciated by those skilled in the art that other types of conversion machines than the illustrated machine 14 may be used to produce the same or other forms of cushioning pads. For further details on an exemplary pad, reference may be had to published PCT Application No. US96/09109, which is hereby incorporated herein by reference.

10

- To compensate for changes in the diameter of the stock roll 20 as the sheet material is payed out, the system 10 includes a constant entry roller 22 at an upstream end of the cushioning conversion machine 14. The sheet material progresses in a downstream direction through the cushioning conversion machine 14 from the upstream end to a downstream end (bottom to top as illustrated in Fig. 1). Downstream from the constant entry roller 22, separators 24-26 separate the plies of the sheet material. The constant entry roller 22 and the separators 24-26 are mounted in a housing 28 which is part of the cushioning conversion machine 14. Further details regarding the constant entry roller and separators may be found in U.S. Patent No. 5,123,889.
- 15  
20

- The illustrated machine 14 generally comprises the housing 28 and cushion-producing/conversion assemblies. The housing 28 may be mounted in any suitable manner to the stand 12. Preferably the housing 28 has a larger dimension or length oriented vertically to provide the packaging system 10 with a small footprint that occupies relatively little space. The conversion assemblies are mounted in the housing 28 along the length thereof to form the pad 16 from the sheet material.
- 25

- The conversion assemblies of the illustrated conversion machine 14 include a forming assembly 30, a feeding assembly 32 and a severing assembly 34, all of which are mounted in and/or are supported by the housing 28. The illustrated forming assembly 30 includes a shaping chute 36 and a forming
- 30

member 34 for folding the lateral edge portions of the sheet material inwardly to form a pair of laterally spaced pillow portions of a strip of cushioning 40. The feeding assembly 32, which in the illustrated embodiment includes a pair of cooperating gear-like members 41 and 42, pulls the sheet material into and  
5 through the forming assembly 30, connects or coins the sheet material through the central band portion to maintain the cushioning integrity of the cushioning strip 40 and pad 16 and pushes the strip of cushioning 40 toward the severing assembly 34. The severing assembly 34 severs or cuts the cushioning strip 40 to form the discrete cushioning pads 16 of a desired length. The severing assembly  
10 34 may be omitted if a dunnage product or pad 16 may be separated from the strip of cushioning 40 in another way, for example by supplying perforated sheet material such that a dunnage product 16 may be severed from the strip of cushioning 40 by tearing. For further details of the illustrated and similar cushion-  
producing or cushioning conversion machines, reference may be had to U.S.  
16 Patent No. 5,123,889 and published PCT Application No. US96/09109.

In the illustrated embodiment, the operation of the cushioning conversion machine 14 is controlled by a control bar 50 which can be grasped from either side of the packaging system 10. The control bar 50 is movable to a first position  
20 for activating the feeding assembly 32 to move the sheet material through the machine 14 and to a second position for activating the severing assembly 34 to sever a discrete cushioning pad 16 from the strip of cushioning 40. Preferably, the control bar 50 is biased to a neutral position between the first and second positions, the neutral position deactivating the feeding assembly 32 and the  
25 severing assembly 34. Other methods and arrangements may be used to control operation of the machine 14.

At the downstream end of the cushioning conversion machine 14 a discharge assembly 52 directs the dunnage product 16 out of the housing 28 to  
30 the shelf assembly 17. The discharge assembly 52 comprises a curved discharge chute 54 for directing the strip of cushioning 40 and the dunnage pad 16 from an upwardly opening outlet of the machine 14 toward the shelf assembly 17. The width of the discharge chute 54 is smaller than the width of the housing 28,

Inasmuch as the width of the strip 40 or pad 16 that enters the discharge chute 54 is considerably less than the width of the sheet material entering the housing 28. As the severing assembly 34 severs a dunnage pad 16 from the strip of cushioning 40, the discharge chute 54 deposits the pad on the shelf assembly 17.

6  
In the preferred embodiment, the shelf assembly 17 includes a packaging shelf or platform 60. The packaging shelf 60 may support the pad 16 directly or the packaging shelf 60 may support a box, bin, carton or other container, and the pads may be deposited into the container. The packaging shelf 60 has a width  
10 that is preferably not greater than the width of the housing 28 or the width of the stand 12 so that the packaging shelf 60 does not extend therebeyond (the width dimension extending between the right and left sides of the system 10 as shown in Fig. 2). A narrow width is desirable to minimize the overall size of the system 10 and the amount of space that it occupies, and improves the portability of the  
15 system 10.

To further enhance the portability and flexibility of the system 10, the packaging shelf 60 is pivotally connected at an inner end to the stand 12 while the other or outer end is supported by a collapsible support or supports 62 that are  
20 connected between the packaging shelf 60 and the stand 12. In the illustrated preferred packaging system 10, the packaging shelf 60 is substantially horizontal in an extended position and retracts through ninety degrees (90°) to lie substantially parallel and adjacent to the vertical framing of the stand 12. In some packaging situations, it may be desirable to operate the cushioning conversion  
25 machine 14 without extending the packaging shelf 60, such as if a single dunnage pad 16 is needed or if a container into which the dunnage product will be placed does not need to be raised to the level of the packaging shelf 60. Furthermore, retracting the packaging shelf 60 trims the profile of the packaging system 10, thereby enabling the packaging system 10 to occupy less space and adding to the  
30 ease with which the packaging system 10 may be transported.

In addition, although in the illustrated embodiment the packaging shelf 60 is rectangular and rigid, variations in the size, shape and materials used to form

the packaging shelf are also encompassed by the present invention. For example, slots or holes may exist in the packaging shelf 60 to reduce the weight and amount of material while providing a substantially rigid support surface or platform for supporting thereon a dunnage pad 16 or container. As another  
5 example, the packaging shelf 60 may be formed of a piece of cloth-like material attached to and supported by support members pivotally extending between the stand 12 and the collapsible supports 62.

In summary, because the packaging shelf 60 is integrated into the  
10 packaging system 10, the packaging shelf 60 is readily available for use with the machine 14, and yet, in the preferred embodiment, the retractable packaging shelf 60 is compactly stowable for transport or when not in use. In either case, however, the integration of the packaging shelf 60 into the system 10 does not  
15 that the packaging shelf 60 is easily transported with the system and cannot be accidentally misplaced therefrom.

According to another embodiment of the invention not shown, the system  
10 may include a plurality of packaging shelves 60 at different heights and/or on different sides of the stand 12. In this arrangement, the discharge chute 54 is  
20 preferably movable, such as by rotation, to discharge dunnage pads 16 to each packaging shelf 60. In this way a plurality of packaging stations could be served by a single cushioning conversion machine 14. In addition, different types of packaging could be performed at each packaging station. For example, one  
25 packaging station could include a relatively high packaging shelf 60, another packaging station could include a relatively low packaging shelf 60 for supporting a taller container thereon, and a third packaging station could be used primarily with the packaging shelf 60 retracted and the dunnage pads 16 delivered to a  
30 container resting on the floor. Such an arrangement would provide increased flexibility in the packaging system 10 to meet the needs of a variety of packaging situations.

In an alternative embodiment of the invention illustrated in Fig. 3, a conversion machine 114 is supported by a stand 112 in a horizontal orientation and a packaging shelf 160 is integrally connected to a side of the stand 112 so as to support dunnage pads discharged from a discharge chute 154 at the exit end of the conversion machine 114. A dunnage pad which is severed from the strip of cushioning formed by the machine will fall by gravity to the packaging shelf 160. The stand 112 includes a base 170 from which a pair of uprights or posts 172 extend vertically. The machine 114 is mounted on and between the posts in a well known manner. The packaging shelf 160 is supported in cantilever-like fashion from the posts by brackets 174, 176 and 178. The shelf and brackets preferably are linked together so that they can be collapsed to retract the shelf to an out-of-the way position beneath the machine.

Another arrangement is shown in Figs. 4 and 5 wherein a conversion machine 214 is supported atop a stand 212 in a horizontal orientation and a packaging shelf 260 is integrally connected to a side of the stand 212 so as to support dunnage pads discharged from a discharge chute 254 at the exit end of the conversion machine 214. A dunnage pad which is severed from the strip of cushioning formed by the machine will fall by gravity to the packaging shelf 260. The stand 212 may be a table or cabinet having a top surface on which the machine is supported. The packaging shelf 260 is supported in cantilever-like fashion from a side of the stand by one or more L-brackets 274. Alternatively, collapsible supports may be used as in the manner illustrated in Figs. 1 and 2, so that the shelf may be retracted against a side of the stand.

Although the invention has been shown and described with respect to a certain preferred embodiment or embodiments, equivalent alterations and modifications will occur to others skilled in the art upon reading and understanding this specification and the annexed drawings. In particular regard to the various functions performed by the above described integers (components, assemblies, devices, compositions, etc.), the terms (including a reference to a "means") used to describe such integers are intended to correspond, unless otherwise indicated, to any integer which performs the specified function of the described integer (i.e.,

that is functionally equivalent), even though not structurally equivalent to the disclosed structure which performs the function in the herein illustrated exemplary embodiment or embodiments of the invention. In addition, while a particular feature of the invention may have been described above with respect to only one of several illustrated embodiments, such feature may be combined with one or more other features of the other embodiments, as may be desired and advantageous for any given or particular application.

What is claimed is:

1. An integrated, self-contained packaging system comprising:  
a cushioning conversion machine having conversion assemblies supported within a housing for converting sheet material into a relatively lower density dunnage product;  
5 a stand for supporting the housing; and  
an integral packaging shelf connected to the stand.
2. A packaging system as set forth in claim 1, wherein the packaging shelf is retractable to lay substantially adjacent the stand.
3. A packaging system as set forth in claim 1, wherein the cushioning conversion machine is oriented in a substantially vertical position.
4. A packaging system as set forth in claim 1, wherein the packaging shelf has a width that is substantially equal to or less than the width of the stand.
5. A method of making a dunnage product with a packaging system including a stand and a cushioning conversion machine having conversion assemblies contained within a housing for converting a sheet material into a relatively lower density dunnage product, the housing being supported by the  
6 stand, and a packaging shelf integrally connected to the stand, the method comprising the steps of:  
supplying the sheet material to the cushioning conversion machine;  
moving the packaging shelf from a vertical retracted position to a horizontal extended position;  
10 converting the sheet material into a relatively lower density dunnage product; and  
depositing the dunnage product on the packaging shelf.



6. A method as set forth in claim 5, wherein the converting step is accomplished with by a cushioning conversion machine which is oriented in a substantially vertical position.

7. A method as set forth in claim 5, wherein the supplying step includes supplying sheet material that is biodegradable, recyclable and composed of a renewable resource.

8. A method as set forth in claim 7, wherein the supplying step includes supplying a sheet material having one or more plies of kraft paper.

9. A method as set forth in claim 5, wherein the depositing step includes depositing the dunnage product into a container supported on the packaging shelf.

10. A method as set forth in claim 5, further comprising the step of moving the packaging shelf from the horizontal extended position to the vertical retracted position.

11. A method as set forth in claim 5, further comprising the step of moving the packaging system to a second packaging location.

12. A packaging system generally as herein described, with reference to or as illustrated in the accompanying drawings.

13. A method generally as herein described, with reference to or as illustrated in the accompanying drawings.



Application No: GB 9827268.5  
Claims searched: 1, 5

Examiner: Howard Reeve  
Date of search: 29 January 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): B8R

Int CI (Ed.6): B31D (5/00, /04); B31F (7/00)

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	WO 96/03273 (RANPAK), see especially figures 1, 17	1, 3
X	US 4619635 (OTTAVIANO), see figures 1 - 4	1

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.